


Teens & Sleep

LINKING DISCOVERY, PRACTICE, AND POLICY

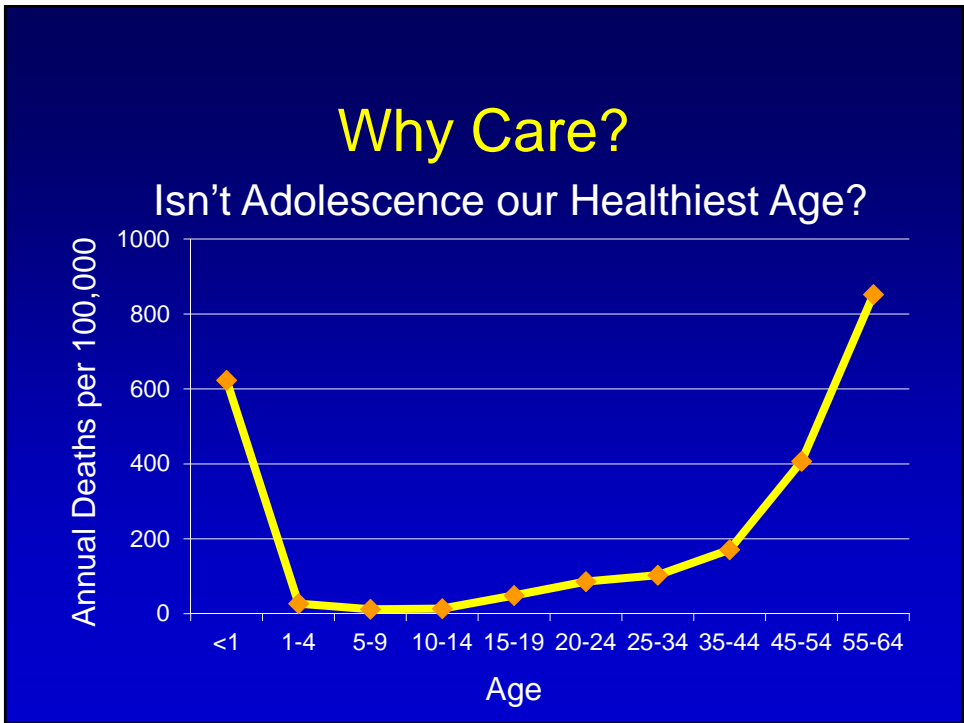
Impact of Inadequate Sleep on Adolescent Health

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University of Cincinnati College of Medicine

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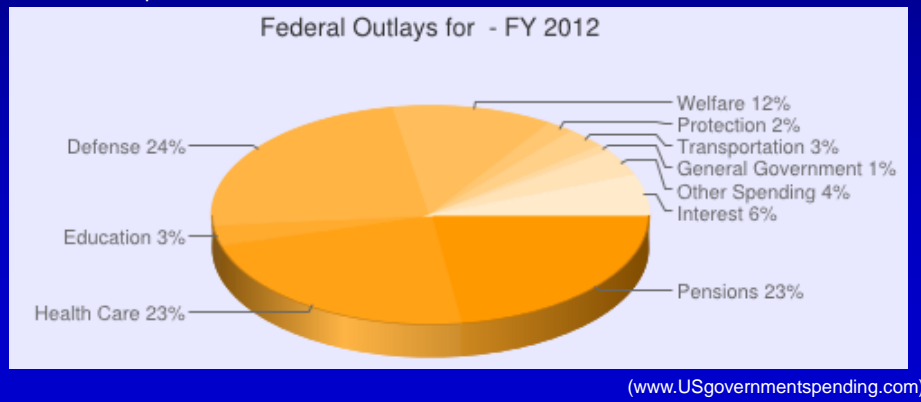


Why Care?

- Adolescent health affects adult health
 - Adolescent onset of mental health conditions
 - High school impacts long-term finances & health
 - Lifestyle factors crystallize during adolescence
 - Adolescent obesity → adult obesity-related complications, even after weight loss
(e.g., Must et al., 2002; Power et al. 1997)
- Prevention efforts challenging in teens
 - Overall effect of obesity prevention <0.1 BMI unit.
(Waters et al., 2011)

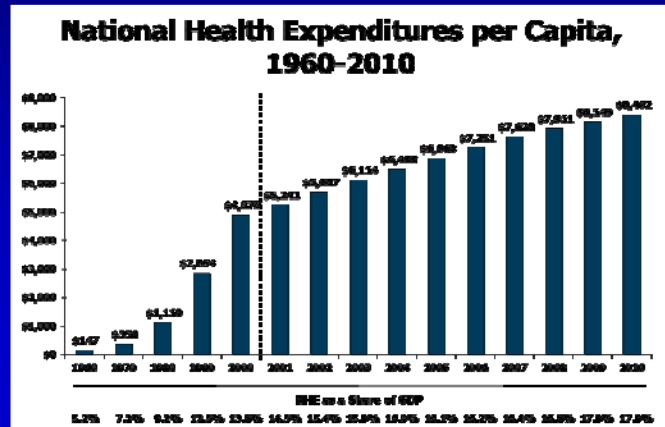
Why Care?

- Healthcare costs are huge
 - \$2.6 Trillion in 2010



Why Care?

- Healthcare costs are huge *and growing*.



Why Care?

(Special "shout-out" to the educators)

- Health needed to learn
- Health promotion programs directly involve schools
- Objections to public policy that promotes teen sleep come from people who are interested in health

Sleep and Health Outcomes

Inadequate sleep causes real-world problems:

Mental Health

- Daytime sleepiness



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Inadequate sleep causes real-world problems:

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- Attention & Learning



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Sleep and Health Outcomes

Inadequate sleep causes real-world problems:

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- Mood / Emotion



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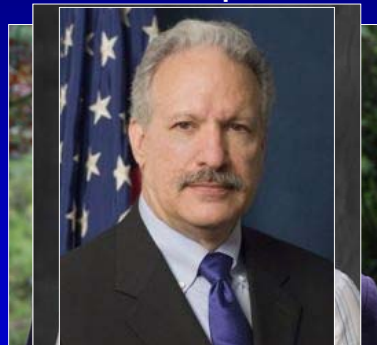
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Sleep and Health Outcomes

Inadequate sleep causes real-world problems:

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- Mood / Emotion
- Risky Behaviors



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Sleep and Health Outcomes

Inadequate sleep causes real-world problems:

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- Attention & Learning
- Mood / Emotion
- Risky Behaviors

Physical Health

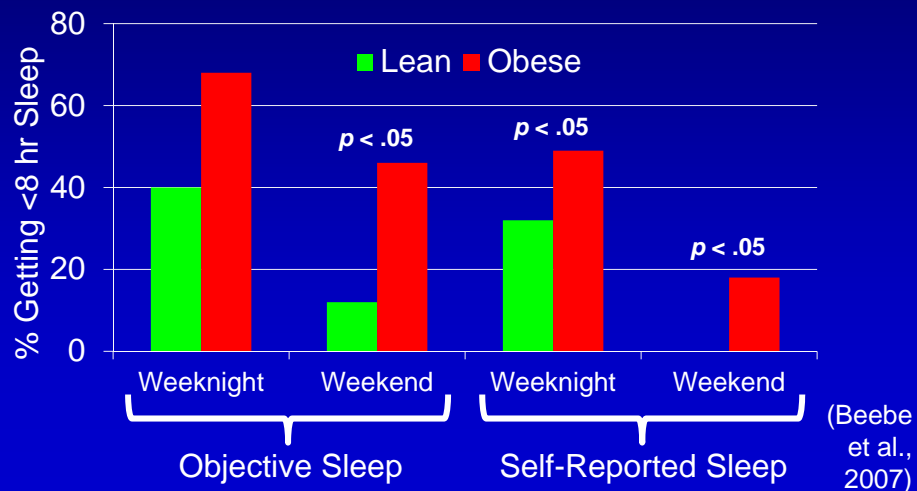
- Obesity
- Athletics
- Illness
- Special Populations

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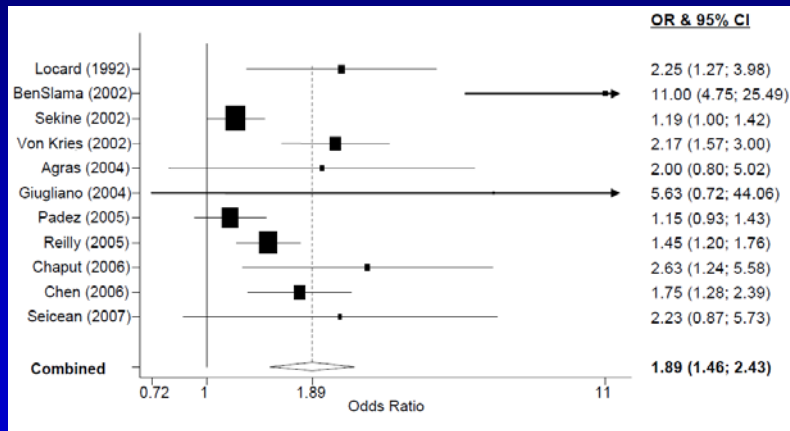


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Short Sleep & Obesity: Real-World Evidence



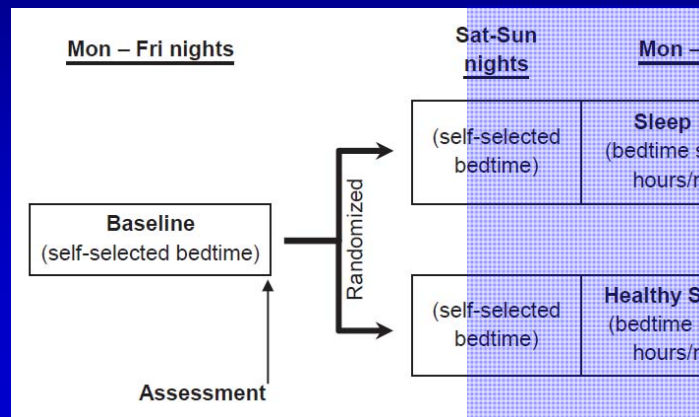
Short Sleep & Obesity: Real-World Evidence



(Cappucio et al., 2008)

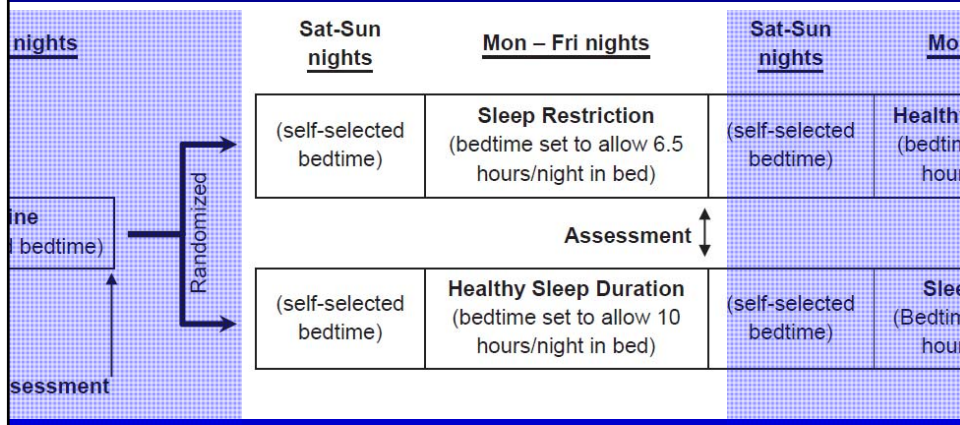
Short Sleep & Obesity: Evidence of Causation

Sleepy Teens Study



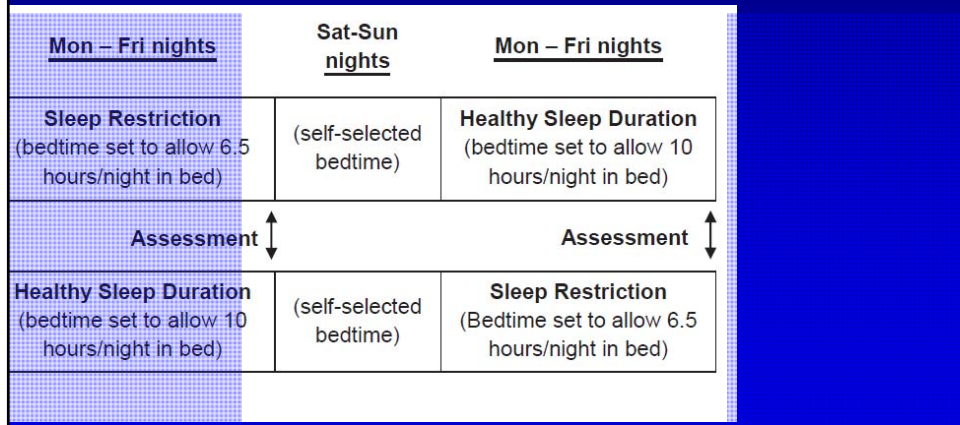
Short Sleep & Obesity: Evidence of Causation

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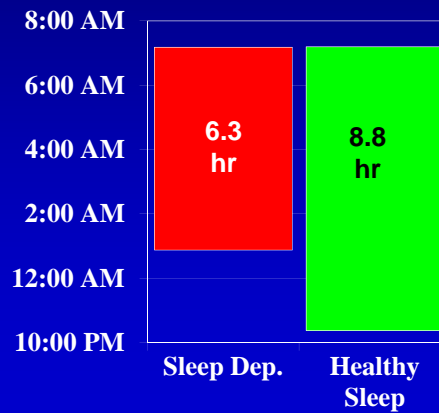
Sleepy Teens Study



Short Sleep & Obesity: Evidence of Causation

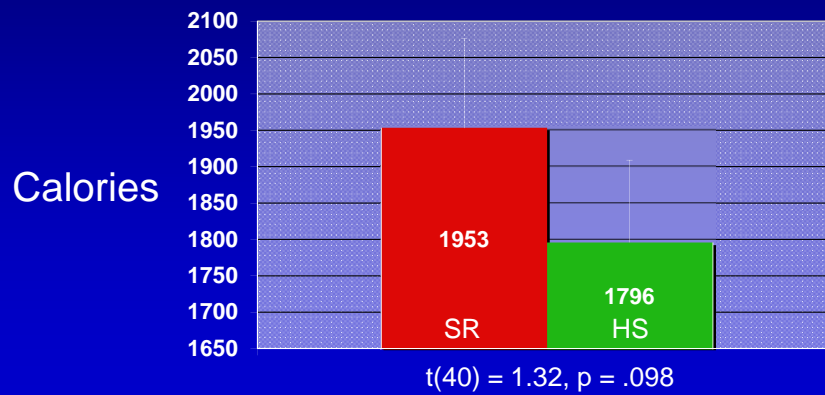
Sleepy Teens Study

**Average
Sleep Schedules**



Short Sleep & Obesity: Evidence of Causation

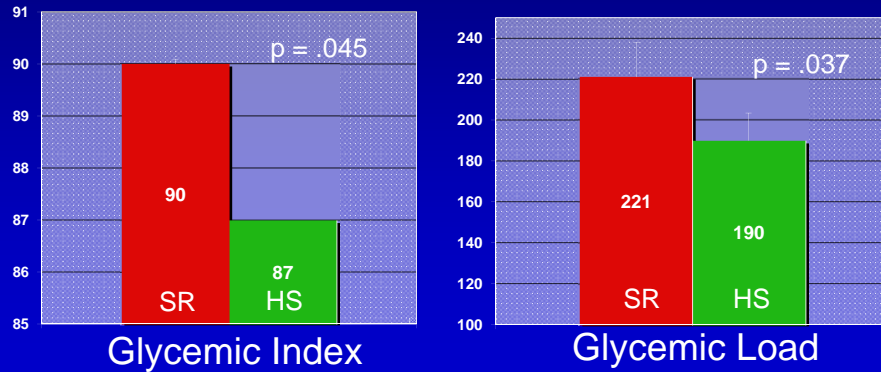
24-hour Dietary Recall, Sleepy Teens Study



(Beebe et al., 2013)

Short Sleep & Obesity: Evidence of Causation

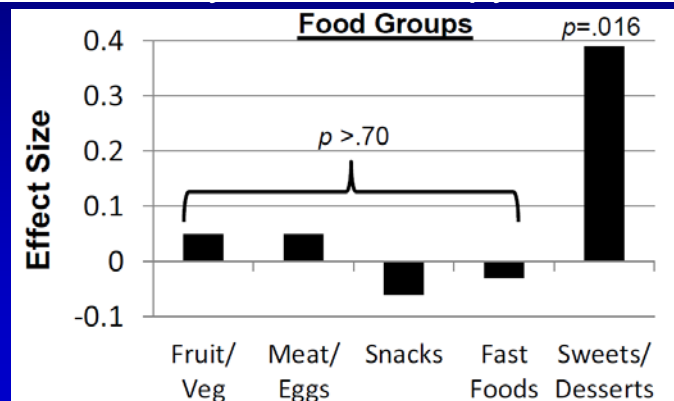
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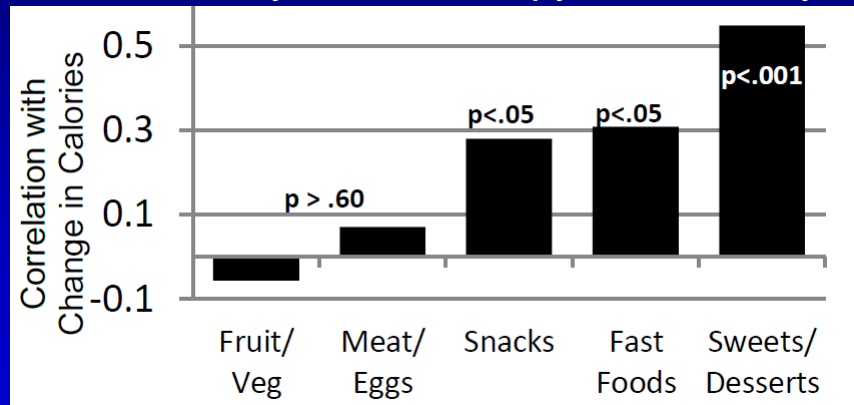
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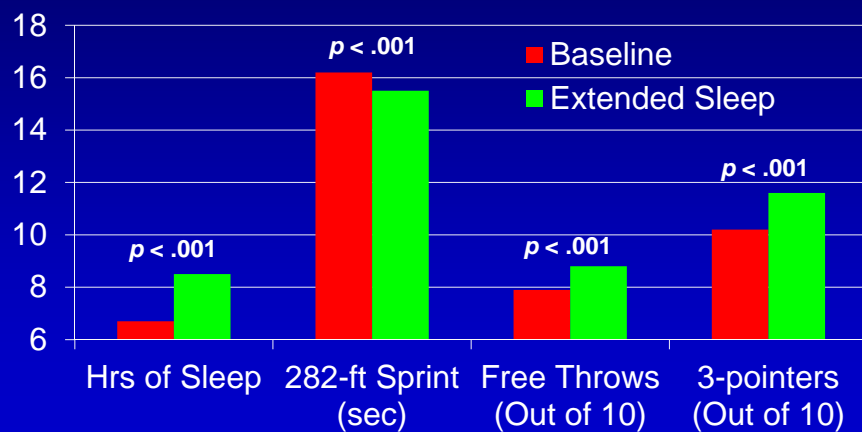
Ratings of Appeal, Sleepy Teens Study



Sleep & Athletics: Real-World Evidence

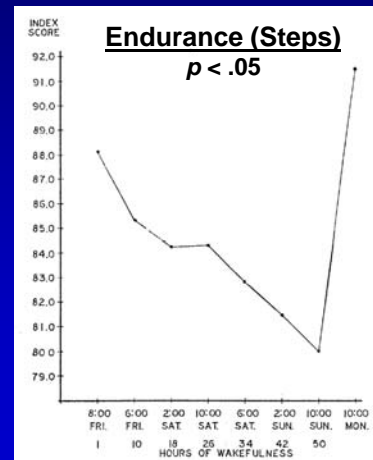
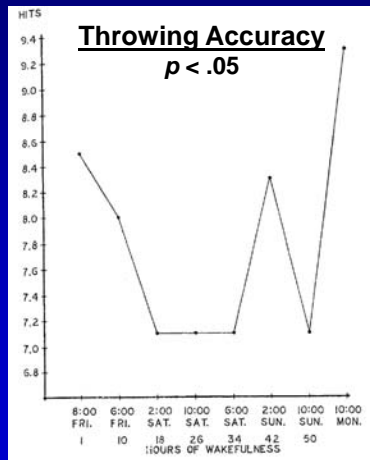
- Short sleep is associated with certain types of sports injuries in youth.
(Luke et al., 2011)
- Even among elite teen athletes, less sleep is associated with less willingness to train hard.
(Engle-Friedman et al, 2010)

Sleep & Athletics: Evidence of Causation



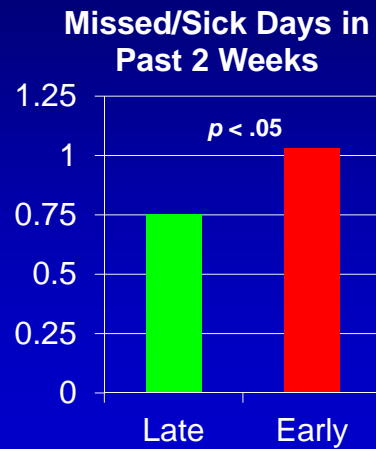
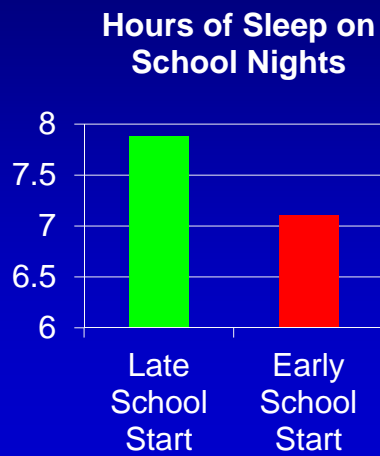
(Mah et al., 2011)

Sleep & Athletics: Evidence of Causation



(Copes & Rosentswieg, 1972)

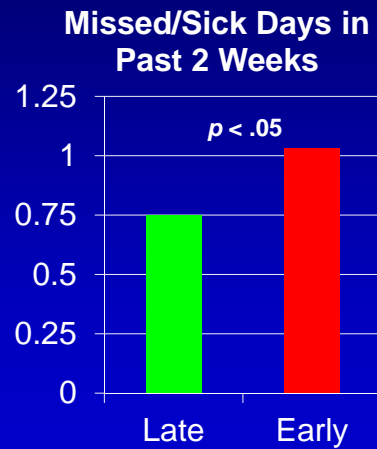
Sleep & Illness: Real-World Evidence



(Wahlstrom, 2002)

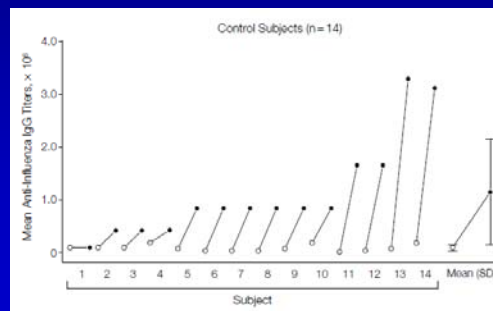
Sleep & Illness: Real-World Evidence

~1/4 day every 2 weeks
= 5 days every year



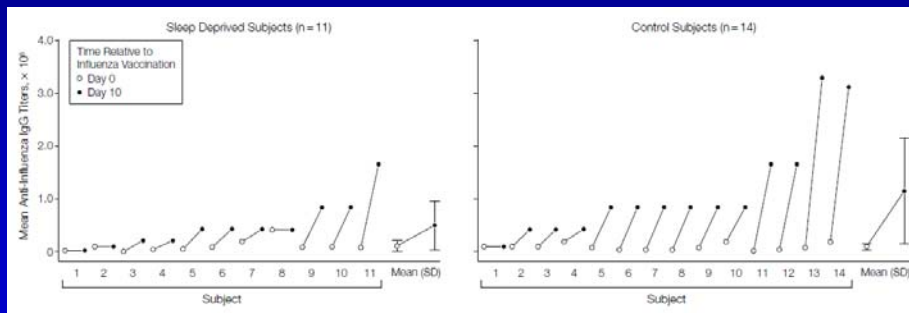
(Wahlstrom, 2002)

Sleep & Illness: Evidence of Causation



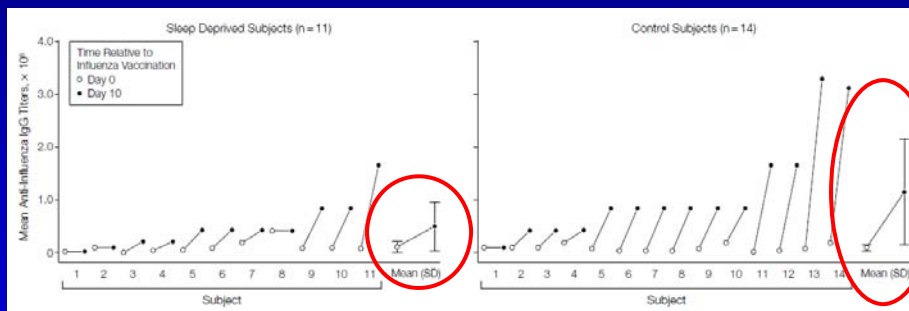
(Spiegel et al., 2002)

Sleep & Illness: Evidence of Causation



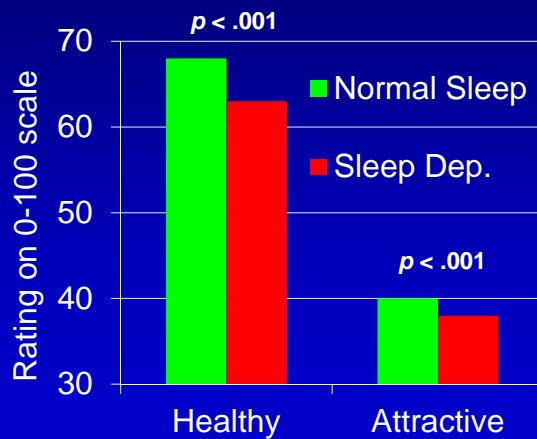
(Spiegel et al., 2002)

Sleep & Illness: Evidence of Causation



(Spiegel et al., 2002)

Sleep & Looking Unwell: Evidence of Causation



(Axelsson et al., 2010)

Sleep & Special Populations: Active Investigations

- **Asthma** (L Meltzer): Sleep dep induces inflammation; does it make asthma worse?
- **Chronic Pain** (T Palermo, T Ward): does sleep dep worsen pain via inflammation or impairment via reduced pain threshold?
- **Diabetes:** (M Perfect): Sleep dep alters glucose regulation and may alter medical adherence; does it make diabetes worse?

Sleep and Health Outcomes

It's time for some real-world solutions.



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Many Thanks

Funding

- American Sleep Medicine Foundation (22-YI-03)
- NIH (K23 HL075369, R01 HL092149, M01 RR026314)

Co-Investigators, Consultants

- Raouf Amin, MD
- Ron Dahl, MD
- Steven Daniels, MD, PhD
- Mark DiFrancesco, PhD
- Sean Drummond, PhD
- Jeff Epstein, PhD
- David Gozal, MD
- Dennis Molfese, PhD
- M. Douglas Ris, PhD
- Douglas Rose, MD

Recent Co-Conspirators:

- >12 graduate students & fellows
- 2 year-round research assistants
- >40 summer research assistants
- 6 fMRI technicians
- 9 EEG technicians
- 2 study physicians

Special thanks to the families who have lent their time and efforts to this work.



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